Code: PTO 91-4881

FEDERAL REPUBLIC OF GERMANY
GERMAN PATENT OFFICE
PATENT NO. 28 08 723
OFFENLEGUNGSSCHRIFT

Int. Cl.^{2}: E 04 C 2/26
B 32 B 13/14
C 04 B 39/00

Application No.: P 28 08 723.2

Filing Date: March 1, 1978

Laid Open to Public Inspection: September 6, 1979

GYPSUM BUILDING PANEL WITH GLASS FIBER MANTLE

[Bauplatte aus Gips mit einer Ummantelung aus Glasfasern]

Applicant: Rigips Baustoffwerke GmbH

Inventor: Requested anonymity

Patent claims

1. Construction panel made of gypsum with a mantle of glass fibers, characterized by the fact that the gypsum construction panel is surrounded on all sides in a type of known gypsum carton

panel with a sheet-like material composed of a glass fiber sheet or woven fabric with a glass fiber mat (4) such that the fabric or sheet (2, 3) and the mat (4) form together a unit and that the sheet or woven fabric layer (2, 3) is turned toward the surface of the gypsum.

2. Construction panel made of gypsum according to Claim 1, characterized by the fact that the glass fiber mat (4) is of differing density so that the lower density side rests on the sheet or woven fabric layer (2, 3) and the side with the greater density points outward.

3. Construction panel made of gypsum according to Claims 1 and 2, characterized by the fact that the glass fibers have been surface-treated.

4. Construction panel made of gypsum according to Claims 1 and 2, characterized by the fact that the glass fibers are surface-coated with a surfactant.

5. Construction panel made of gypsum according to Claims 1 to 4, characterized by the fact that the gypsum slurry to form the core (1) of the panel is made of a mixture of α- and/or β-semihydrated gypsum and contains fibers and also a surfactant.

6. Construction panel made of gypsum according to Claims 1 to 5, characterized by the fact that the mantle consisting of an outer surface of the glass fiber sheet or fabric and glass fiber mat is provided with an adhesion-promoting layer (primer layer) or another surface coating.

7. Construction panel made of gypsum according to Claims 1 to 6, characterized by the fact that the strands (2 and 3) of the glass fiber sheet are of different strength.

The invention pertains to a building panel that uses gypsum with a glass fiber mantle.

Gypsum building panels with very different designs are known. Most widely used and also the best known ones are gypsum building panels with a cardboard mantle that are now widely used in building companies under the tradename of gypsum sandwich plaster board due to their numerous advantages. These sandwich plaster boards are usually produced in dimensions of 2.50 m by 1.25 m in differing thicknesses. Such panels are most widely used as linings for spacer walls in the form of building panels on the frames between the floors made of studs, threshold and panels lined on both sides with these sandwich plaster boards. The space between these panels is usually filled with a combustible material to reduce the passage of sound waves.

Thus there has been no lack of attempts to replace this combustible panel mantle by a noncombustible mantle. Now instead of the combustible panel mantle of organic material, it has been suggested to use a mantle of inorganic material; thus numerous proposals have been made to use glass fiber and glass fiber mat for surrounding these sandwich plaster panels instead of the cardboard.

Sandwich plaster panels are produced as is known, on a machine that first handles the front side of the panel on a moving, endless conveyor belt, and the edges of the panel are curved up so that a trough is produced into which the flowable gypsum slurry is poured.

Then the back side of the panel is fed in and the entire item is passed between shaping rollers so that the product obtains its final form, the gypsum begins to solidify and the

edges of the visible side of the panel are folded down, so that the back side of the panel can then be securely glued on.

So, what could be more natural than to used these well known machines also for the production of those building panels whose gypsum core is surrounded by a glass fiber-containing product?

The disadvantage here is that glass fiber fabric and glass fiber mat could not be used as a mantle for the plastic gypsum core in this mode, because they have only a small shape stability, so that large tensile forces cannot be transferred to this sheet-like, glass fiber material. This disadvantage could be eliminated by making the fabric and also the mat thicker and stronger, but they are then much less suitable for bonding with the gypsum and moreover, this increase in material thickness is also prohibited for economic reasons. Another disadvantage is that if the fabric mesh is too wide or if a large-pore fabric is used, when the flowable gypsum slurry is squeezed through these meshes and pores during the shaping process of the plate, a considerable fouling of the machinery and the conveyor devices occurs, so that in the short- or long-term, the machine will become useless and will have to be cleaned again, because the squeezed out gypsum slurry solidifies and becomes hard. This also leads to economically infeasible downtimes.

These gypsum-permeable glass fiber fabrics and/or bonded fiber fabric sheets can also be coated on one side with a paper sheet such that the paper sheet prevents the passage of the flowable material, and second, additional force effects now become possible and third, it can be pulled off after finishing of the product, so that the mantle of the gypsum building panel is free of combustible materials.

This procedure also has not been able to take over, because this type of mantling material is not only complicated and thus expensive to produce, but also requires an additional processing step, namely the pull-off, which has the danger that the applied glass fiber fabric is torn off from the gypsum core at least in some areas or spot. Now it turns out that the adhesion or bonding of the gypsum slurry or of the gypsum crystals with the smooth glass fiber surface is not always satisfactory, and this is due to the differences in the material, namely the calcium sulfate dihydrate on the one hand, and the silicic acid on the other hand.

Thus the problem of the present invention is to create a building panel of the type described above that is surrounded by a noncombustible, glass fiber material which can be easily bonded to known sandwich plaster panels on sandwich plaster panel processing machines, that also has the needed strengths, that bonds fully and without flaws to the gypsum and that contains no combustible material.

This problem is solved by the fact that the gypsum building panel is surrounded on all sides with a sheet-like material consisting of a glass fiber sheet or fabric with a glass fiber chopped mat formed on it, such that the sheet or fabric and the mat together form a single unit, and that the fabric or sheet layer is facing the surface of the gypsum.

Preferably the mat layer of the layers of sheet or fabric and mat is designed with differing thickness, namely with a smaller density on the side facing the sheet or fabric, and has a greater thickness on the outside, so that initially the relatively large pores are facing the gypsum surface, whose size

then gradually decreases toward the outer surface of the fabric, so that finally only very fine pores remain, and are provided only so that the water vapor can escape through these pores when drying the gypsum panel.

In a refinement of the invention, the single glass fibers of the sheet or fabric and also the mat can be surface treated, e.g., by roughening, but it can also be sprayed with a surfactant, so that a faster and tighter wetting of the glass fibers by the flowable, water-containing gypsum slurry (which is a slurry of α- and/or β-semihydrate and is merely called a gypsum slurry for convenience) will take place. Treatment of the fabric or sheet side of the mantling product with a surfactant can take place in a preparatory step, but also shortly before application of this glass fiber combination to the gypsum core, for example, by spraying or moistening the side facing the gypsum core with a surfactant or by coating it with the surfactant.

Processing of the glass fiber material for mantling of the gypsum panel for the invention takes place like the known processing of the cellulose cardboard in the production of sandwich plaster boards. The gypsum slurry will also be prepared essentially in the same manner as in the production of sandwich plaster panels. The attachment of the edges of the mantled glass fiber material to the corresponding other sheet takes place by using suitable inorganic or organic adhesives in a standard glued-panel application or by using gypsum slurry in a hot-melt adhesive application method, depending on the type and purpose of plates being produced, or by mechanical crimping.

The invented plates possess all the advantages of the known sandwich plaster panels and moreover, the additional advantage of

noncombustability, and the visible side of this plate has such a smooth and architecturally pleasing surface, which is desired, so that it can also be painted, and then will require no further processing or coating. Furthermore, this glass fiber surface can also be coated, perhaps after application of a primer layer, with additional materials.

The invention will now be described in greater detail based on one enlarged cross section through one such invented panel, where the mantle consists of a combination of fabric and mat.

In this cross section the reference number (1) denotes the gypsum core, reference number (2) denotes the glass fiber strands of the glass fiber fabric running in the plane of the sheet in the figure, number (3) denotes the strands of the glass fiber fabric running perpendicular to the paper plane, and (4) is the glass fiber mat.

From the figures we see that the fabric and the mat form a single unit, since the fibers of the mat (4) partly surround the glass fiber strand (3) of the fabric, so that the fabric is bonded with the mat. The fabric threads are joined together in a known manner, as shown at (5), and the mat is produced on the fabric. The bonded fibers extend into a plane running through the middle of the glass fiber strand (3) of the fabric, so that between glass fiber strand (2) and the surface of the mat (4) a cavity is produced that is free of glass fibers of the mat; the same is also true of the glass fiber structure on the other side of the panel.

The material for the mantle of the panel is consistent, that is, it is everywhere the same.

The production of the panel proceeds like the production of sandwich plaster panels. First, the "visible-side coating" would be introduced into the machine, for example, the one generally denoted by symbol (A). The gypsum slurry would be distributed on this sheet to form the plaster core (1). Due to this distribution process, the gypsum slurry penetrates into the fabric, perhaps up to line (6), so that the strand (2) and also a part of the mat are penetrated by the flowable gypsum slurry. Now if the back-side coating (R) is applied, then the same process takes place and the gypsum slurry will be pressed into the glass fiber covering up to line (6) by the shaping process, so that strand (2) and also a part of the mat (4) are covered.

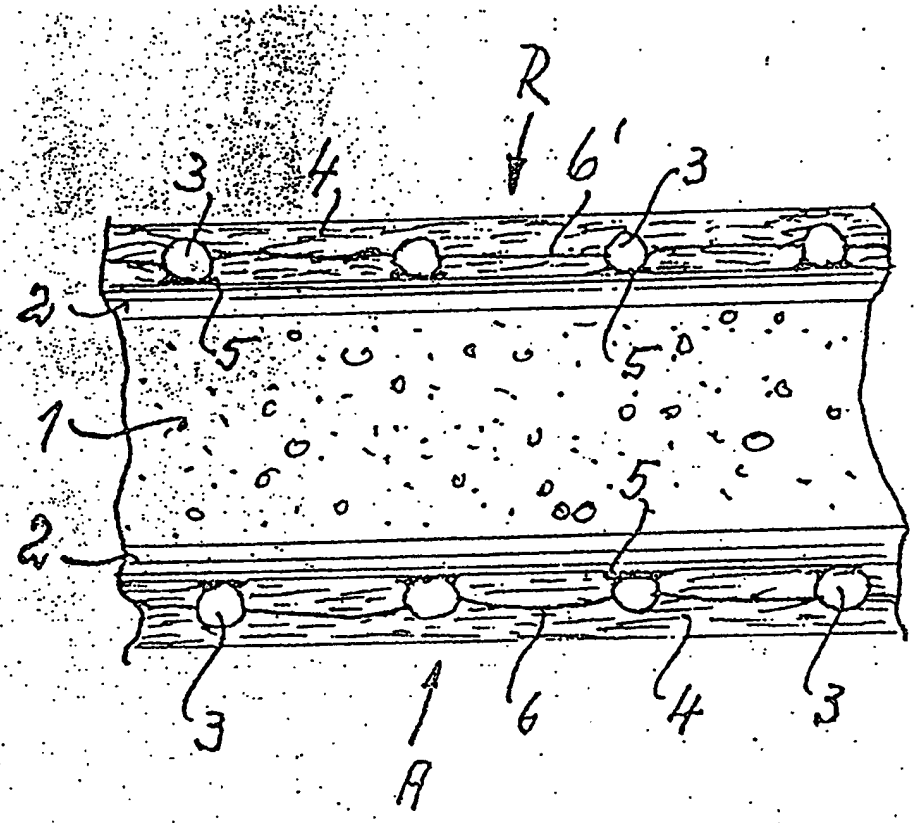
By covering the glass fibers, especially those of the fabric, good mechanical bonding can be effected. Moreover, for the invention, the surface of the glass fiber coating (A) or (R) facing the plaster slurry can be treated with a surfactant, for example, by spraying, imprinting, or immersion. Due to application of the surfactant to the glass fibers directly neighboring the gypsum slurry, a complete and thorough contact with the gypsum slurry will take place, so that the bonding between glass fiber and gypsum slurry is improved in the finished product, but also a faster and more complete penetration and wetting of the water-containing, flowable gypsum slurry into the glass fiber material will take place during the production process.

Since moreover the mat has a greater pore size on the side facing the fabric or the plaster core than on its outward-pointing surface, the flowable, water-containing gypsum slurry can penetrate relatively far into the mat (4). This is

illustrated by lines (6) or (6′) in the figure to provide a better understanding of the essence of the invention.

The bonding of the glass fiber mat with the glass fiber fabric or the arrangement of glass fiber strands (2) and (3) of the fabric to the mat, takes place preferably by taking into account the production direction and the size of the material sheet, so that the glass fiber strands (3) embedded in the mat will run preferably in the running direction or production direction of the invented panel.

The mesh width of fabric and sheet can vary; it is tailored in every case to production with the mat lying on top. In this regard notice that, e.g., the fabric can also contain different thickness strands. The glass strands of fabric and sheet can be coated, covered, flock coated, or subjected to other surface treatment.


R
6'
3
4
3
2
5
5
1
5
2
3
6
4
3
A